

XWHEP 5.6.3 User Guide

Installation, Usage and Programming
Edition 1, for XWHEP version 5.6.3
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1 Introduction

XtremWeb for High Energy Physics (*XWHEP*) is a global computing platform aiming to aggregate volunteer computing resources over the Internet. Contrary of what the name could make readers think, this is a general purpose platform, not specifically dedicated to High Energy Physics (*HEP*) community. The name should preferably be understood as XtremWeb *BY* High Energy Physics.

Historically speaking, XtremWeb (<http://www.xtremweb.net/>) is a project initiated by Laboratoire de Recherche en Informatique (LRI) (<http://www.lri.fr/>).

In a pluri-disciplinal initiative, Laboratoire de l'Accelrateur Linaire (LAL) (<http://www.lal.in2p3.fr/>) and LRI joined their efforts to make what was a research platform aiming to study large scale distributed systems (*LSDS*) to a full production platform, naturally using HEP applications as first use cases (naturally, since LAL is an HEP laboratory). This common work having been a success, LAL continued not only to work with the platform in production, but also to extend and improve it in several ways under the name of XWHEP.

This document first presents XWHEP and its innovative features; then describes how to compile, install and deploy the platform. The last chapter is about inter-grid connections, the goal of such a feature, its security issues and finally how to make such inter-connections operable.

The targeted audience is not only developpers and administrators willing to deploy an LSDS, but also end users that can gain access to a new computing power. Finally volunteer PC owners who would like to participate to exciting research fields will also find useful informations here, on how to install and manage their PC as part of a global virtual cluster.

1.1 Reading conventions

- variables are refered like this : `${install.dir}`;
- `${version}` refers to the version of XWHEP (currently 5.6.3);
- code samples are given using courier font

```
$> make distrib
```

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2 XWHEP

2.1 Overview

XWHEP (<http://dghep.lal.in2p3.fr/spip.php?rubrique13>) is a middleware permitting to deploy a Global Computing platform (Large Scale Distributed System). XWHEP belongs to the so called *Cycle Stealing* environment family. Like the other Distributed System Platforms, an XWHEP platform uses remote resources (PCs, workstations, PDA, servers) connected to Internet or a pool of resources inside a LAN. Participants of an XWHEP platform cooperate by providing their computing resources, such as processor, memory and/or disk space.

XWHEP is a project belonging to light weight GRID systems. Its a Free Software (GPL), Open Source and non-profit software platform to explore scientific issues and applications of Global Computing and Peer to Peer distributed systems.

The XWHEP software platform allows to setup and run Distributed System projects. Such project must be based on a community of participants. For example, XWHEP platforms allow a High School, a University... or a Company to setup and run a Global Computing or Peer to Peer distributed system for either a specific application or a range of applications.

2.2 Architecture

The XWHEP project is made of three parts:

- the server is the centralized part in charge of the platform management; it is detailed on section [\[XWHEP server\]](#), page [\[undefined\]](#);
- the worker is a distributed part deployed on PCs over the internet to provide computing resources; it is detailed on section [\[XWHEP worker\]](#), page [\[undefined\]](#);
- the client is a distributed part deployed on PCs over the internet which interacts with the platform; it is detailed on section [\[XWHEP client\]](#), page [\[undefined\]](#).

This architecture corresponds to most of well known Global Computing Projects. Compared to some other platforms, XWHEP also allows to connect several Servers and Result Collectors on a single project (Workers keep a collection of Server and Result Collectors IP address). During the execution, the workers contact the Server to get jobs. In response, the Server sends a set of parameter and it also may send an application if the application is not already stored in the Workers. As soon as the Workers end their jobs, they contact the Result Collector to send the results. Depending on the result size, the communication between the Workers and the Result Collector use different protocols. Currently, the worker

may send results with size up to 100 MBytes. In this architecture, the Client and the Server are the same computer.

2.3 What can I do with XWHEP

As a system software, XWHEP allows you to:

1. use a Peer-to-Peer computing platform.
2. participate (provide computing resources) to a Global Computing or a Peer-to-Peer Project by joining an XWHEP platform (see the projects links on the main page),
3. be collaborator of XWHEP by helping us developing XWHEP ,
4. easily build your own General Purpose Global Computing System.

Participants may download the Worker software to participate. XWHEP Worker examines constantly the workload of your PC. When the workload becomes insignificant, your PC starts participating to a world wide experiment (research or large contests). For most of the PCs, the computation is done during the night.

Any one can download the entire software (Worker, Server, Lan administrator) to setup their own XWHEP platform.

Large institutions that are spread among several geographical sites and that are using cycle stealing to increase their computational power may use XWHEP to manage all the resources through a single environment. By downloading the entire XWHEP system you will be able to launch a Global Computing or a Peer-to-Peer Computing system. To do so, you will have to setup a community of workers. Dedicated Global Computing System particularly match the requirements of institutions like Schools, Universities, Laboratories, Libraries, Factories, Industries, ..., Companies that need a system allowing the use of idle resources during the nights or week-end.

2.4 Features

XWHEP is a generic multi purposes desktop grid platform (DG) enabling eSciences computations over volatile nodes.

Main features are :

- three tiers architecture with a centralized scheduler
- multi platforms (win32, linux, mac os x)
- virtual stable cluster over volatile volunteers individual PCs
- multi applications
- multi users
- firewall bypassing
- automatic load balancing
- fault tolerance

2.5 Planned Features

- some security stuffs are in the current implementation, but not fully tested yet since it leads to problems in a P2P mode;
- result certification is not implemented at all since it is a huge problem;
- worker sandbox is ready for Mac OS X 10.5 but not inserted in the current release. A sandbox feature is ready to use for all Linux platforms.

- replication and pessimistic message logging are implemented to prevent faults;
- server migration is planned but not implemented

3 Getting XWHEP

The XWHEP package is downloadable from the web site (<http://dghep.lal.in2p3.fr/spip.php?article46>);
You will find there sources and installers.

3.1 Downloading XWHEP source package

There are two ways to get the XWHEP sources; you can:

- download them from the web site (<http://dghep.lal.in2p3.fr/spip.php?article46>);
You get XWHEP-`{version}`.tar.bz2.

Untar it with the command

```
tar xvfj XWHEP-{version}.tar.bz2.
```

- get them from the XWHEP SVN.

One SVN commands are necessary:

```
svn co https://svn.lal.in2p3.fr/projects/XWHEP/tags/{version}/ targetDir
```

Where `{version}` is the current version number (e.g 6.0.0).

3.2 Downloading XWHEP binary package

There are two ways to get the XWHEP sources; you can:

- download them from the web site (<http://dghep.lal.in2p3.fr/spip.php?article46>);
You get XWHEP-`{version}`-bin.tar.gz.

Untar it with the command

```
tar xvfz XWHEP-{version}-bin.tar.gz.
```

4 Setting up XWHEP

The XWHEP deployment is a three steps process

- generate the binary package from source one (or directly download the binary package from XWHEP web site (<http://dghep.lal.in2p3.fr/spip.php?rubrique13>))
- generate server, worker and client packages from XWHEP binary package
- install server and deploy workers and clients

This chapter is divided as follow:

4.1 Pre-requisit

There are some requirements in order to be able to use XWHEP packages (both source and binary). All requirements are tested at deployment time (see [Building the deployment packages](#), page [Building the deployment packages](#)).

Pre-requisit to install XWHEP are:

- A Mysql server. You must have a MySQL server up and running. Be sure that the following condition are met :
 1. Your server accept network connection. Please verify in the mysql configuration file (usually `/etc/mysql/my/cnf`) that the field `skip networking` is commented.
 2. You have an account who holds enough privileges to add user and create databases. If you don't please ask your database administrator to help you.

- A Java environment (Sun JDK 1.5 or above is mandatory)

<http://java.sun.com/>

- Several third partie Java classes are needed. They are included in XWHEP package:
 - `jsse1.0.2` composed of `jcirt.jar`, `jnet.jar`, `jsse.jar` for SSL (OpenSSL (<http://www.openssl.org/>));
 - `openxml-1.2.jar`(OpenXML (<http://www.philo.de/xml/>)), `MinML.jar`(MinML (<http://www.wilson.co.uk/xml/minml.htm>)) for parsing XML;
 - `antlr.jar` is a lexical translator (ANTLR (<http://www.antlr.org>)) to parse service calls;
 - `hsqldb.jar`, a 100% Java SQL DataBase Engine, (HSQLDB (<http://hsqldb.sourceforge.net/>)) to embed database in server;
 - `mysql-connector-java-5.1.6-bin.jar` (MySQL (<http://dev.mysql.com/downloads/mysql/5.1>)) to access MySQL databases;

4.2 Building from sources

You are not compelled to build XWHEP from sources, you can download the binary package from the XWHEP web site (<http://dghep.lal.in2p3.fr/spip.php?rubrique13>). If you have done so, you can directly go to [\[Building the deployment packages\]](#), page [\[Building the deployment packages\]](#).

The XWHEP middleware is written in Java language, hence the Java package (<http://java.sun.com/>) is the first requirement to build and run XWHEP . The build process use the Apache Ant (<http://ant.apache.org/>) build tool; it first expects the JAVA_HOME environment variable to be set.

Note for Windows users: it is possible to configure, build and install XWHEP in this platform, using Cygwin (<http://www.cygwin.com/>). This should work, but is not supported.

4.2.1 Sources package structure

The package contains seven directories:

- ‘benchmark/’, a set of scripts to benchmark the platform
- ‘build/’, needed files to compile, install etc.;
- ‘classes/’, Third Party classes;
- ‘doc/’, this documentation files;
- ‘misc/’, several needed files, such as config ones;
- ‘php/’, WEB SITE (php scripts) files;
- ‘src/’, sources directory hierarchy.

You don’t have to set any environment variable, but for the following of the installation procedure, we assume that `${sources.dir}` is the place where XWHEP sources are stored and `${install.dir}` is the installation directory (where `make` installs the binary package).

4.2.2 Preparing the build process

Several parameters should be set in ‘build/build.conf’ configuration file to build and install the package.

- `install.dir` : contains the directory where the binary package will be installed
- `install.www.dir` : contains the directory where the PHP pages will be copied
- `ganglia.www.dir` : contains the directory where the ganglia templates for XWHEP will be copied
- `xwidl.opts` : you should never modify this

4.2.3 Preparing the binary package

The source package can prepare the binary package which aims to generate deployment packages. Binary package usage is described in [\[Building the deployment packages\]](#), page [\[Building the deployment packages\]](#).

At this point, you must have first read [\[Preparing the build process\]](#), page [\[Preparing the build process\]](#).

As soon as ‘build/build.conf’ has been edited, you can build and install the binary package using :

```
$> make
```

Installation process includes several steps (assuming build.conf is correct...) :

- `distrib` : this compiles the Java files
- `package` : this install the binary package
- `doc` : this generates the JavaDoc (API documentation)
- `uninstall` : this removes the binary package
- `clean` : this removes compiled Java files (but leaves the installed binary package)

By invoking `make` you implicitly call *distrib* and *package*.

4.3 Building the deployment packages.

The binary package aims to generate server, worker and client packages. These packages help to deploy the platform.

At this point, you either generated the binary package from source package as described in [\(undefined\) \[Building from sources\]](#), page [\(undefined\)](#), or downloaded the binary package from the web site (<http://dghep.lal.in2p3.fr/spip.php?rubrique15>).

We can not directly propose packages from our web site since it is impossible to create generic installers because each deployment has its own private datas (mysql configuration, electronic keys etc.).

If you have downloaded the XWHEP source package, please refer to [\(undefined\) \[Building from sources\]](#), page [\(undefined\)](#).

This section describes how to prepare packages for the three XWHEP parts as follow :

4.3.1 Binary package structure

The package contains seven directories:

- ‘apptest/’, a simple application to test XWHEP
- ‘bin/’, XWHEP scripts
- ‘conf/’, configuration files
- ‘doc/’, this documentation files;
- ‘installers/’, linux, Win32 and Mac OS X packages
- ‘keystore/’, electronic keys
- ‘lib/’, needed jar files

You don’t have to set any environnement variable, but for the following of the installation procedure, we assume that `${install.dir}` is the installation directory.

4.3.2 Running the binary package configuration script

The procedure is explained in the tutorial (`XWHEP-tutorial.html`).

4.4 Deploying the platform

As soon as you have successfully run the ‘`xwconfigure`’ script as describe `<undefined>` [Building the deployment packages], page `<undefined>`, you packages are ready.

You can now use them to install you server and deploy your clients and workers.

4.4.1 Preparing the server package.

The server is the XWHEP centralized part; it aims to ensure the platform coherency.

The package is provided as an ‘RPM’ file downloadable from the platform web site; it should be used with the *rpm* tool.

Please refer to `<undefined>` [XWHEP server], page `<undefined>` to see how to configure and run the server.

4.4.2 Preparing the client package.

The client installation is platform independant; win32 installation needs Cygwin (<http://www.cygwin.com/>).

The package is provided as a ‘`tar.bz2`’ compressed file downloadable from the platform website; it should be uncompressed in a dedicated directory.

Please refer to `<undefined>` [XWHEP client], page `<undefined>` to see how to configure and run the client.

4.4.3 Preparing the worker package.

The worker installation is platform dependant.

4.4.3.1 Linux.

The package is provided as an ‘RPM’ compressed file downloadable from the platform website; it should be used with the *rpm* tool.

The RPM installs everything in ‘`/opt/XWHEP-{version}/`’.

Please refer to `<undefined>` [XWHEP worker], page `<undefined>` to see how to configure and run the worker.

4.4.3.2 Mac OS X.

The package is provided as a ‘zip’ compressed file downloadable from the platform web site; it should be uncompressed in a dedicated directory to get the content as shown in (undefined) [Figure 1 : Mac OS X Package], page (undefined).

Figure 1 : Mac OS X Package



The Mac OS X Package

This is a Mac OS X package; double click on it and follow instructions. The administrator password is required to install the package. If needed, please ask your system administrator.

The package installs :

- ‘/Applications/xtremweb.worker/index.html’ an HTML file to help understanding on worker usage
- ‘/Library/StartupItems/xtremweb.worker/xtremweb.worker’ a script to manage the local worker
- ‘/usr/local/bin/xtremweb.worker’ a script used by the previous one
- ‘/private/etc//xtremweb.worker/’ contains several files needed by the worker
- ‘/private/etc//xtremweb.worker/’ contains several files needed by the worker

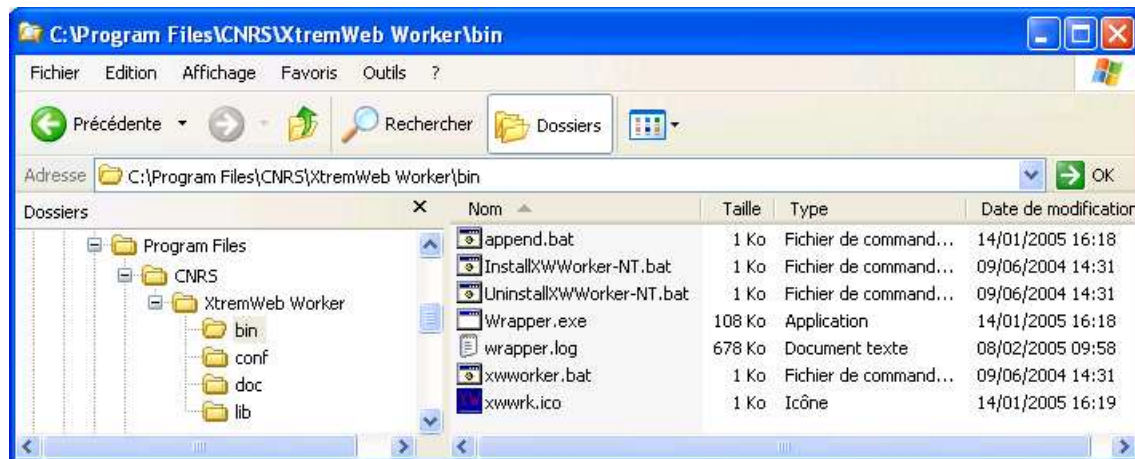
Please refer to (undefined) [XWHEP worker], page (undefined) to see how to configure and run the worker.

4.4.3.3 Win32.

Please note that all images included in this section are screen copies, hence they may contain text in french due to my Windows installation.
Hope this is understandable for non french reader :).

The package is provided as an ‘.exe’ file downloadable from the platform web site.
As download finished, you can double click to run it; this creates a directory hierarchy typically in the ‘Program Files’ folder, as shown in [\[Figure 2 : Typical installation\]](#), page [\[undefined\]](#).

Figure 2 : Typical installation



The ‘bin/’ directory contains several scripts as shown in [\[Figure 3 : Install NT service\]](#), page [\[undefined\]](#).

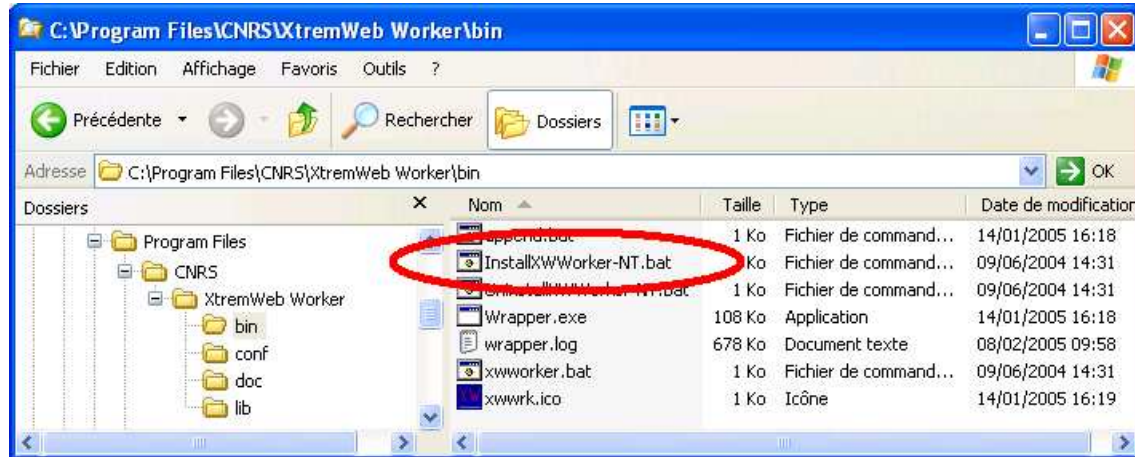
Among them are:

- xworker.bat; double click to manually run the XWHEP worker;
- InstallXWWorker-NT.bat; double click to install the XWHEP worker as Windows service;
- UninstallXWWorker-NT.bat; double click to uninstall the XWHEP worker Windows service.

Preparing the worker package as Windows service is the best way to use it. It will then run in background without disturbing the owner of the machine; by default, it will only compute when the owner don't use it machine. See [\[xtremweb.worker.conf\]](#), page [\[undefined\]](#) for more information on configuring the worker.

Double click on 'bin/InstallXWorker-NT.bat' to install the worker as Windows service as shown in (undefined) [Figure 3 : Install NT service], page (undefined). Installing an NT service requires administrator privileges; please ask your system administrator, if needed.

Figure 3 : Install the worker as NT service

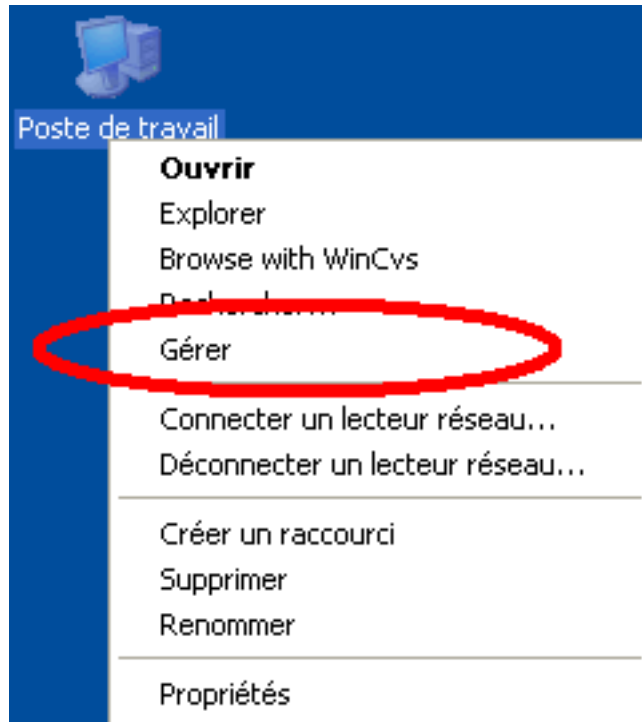


You can check that the worker service has been correctly installed.

This procedure will also help to manage the service :

- manually start the service;
- manually stop the service;

To do so, first right click on your workstation icon in your start menu or on your desktop, then click on "manage" item, as shown in (undefined) [Figure 4 : Manage NT workstation], page (undefined).

Figure 4 : Select the “manage” option

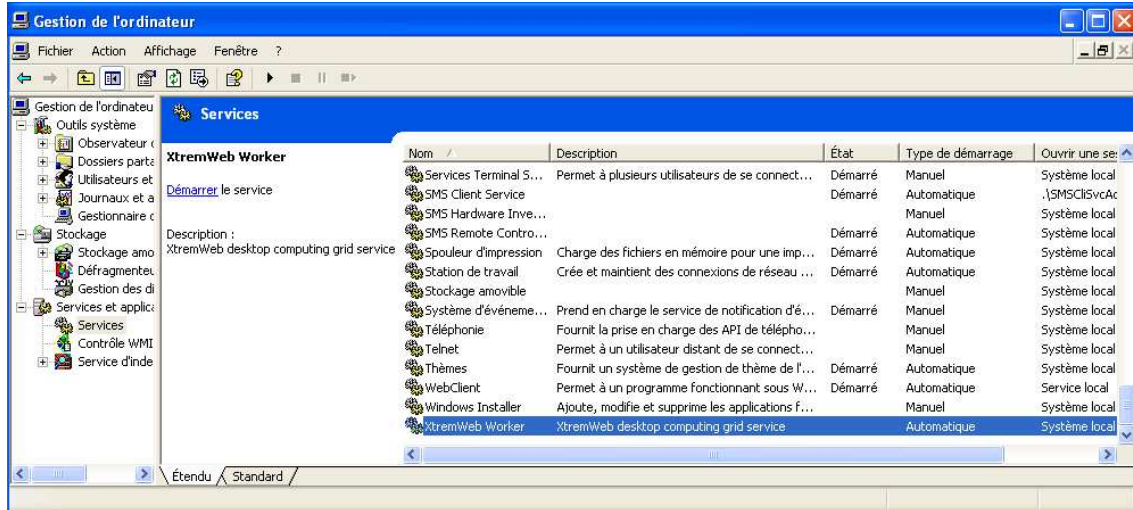
This opens the workstation management window.

Select the “services and applications” item, then the “services” item and look for the XWHEP service as shown in [\(undefined\)](#) [Figure 6 : NT service installed], page [\(undefined\)](#).

It should be the last one in the list, depending on your configuration.

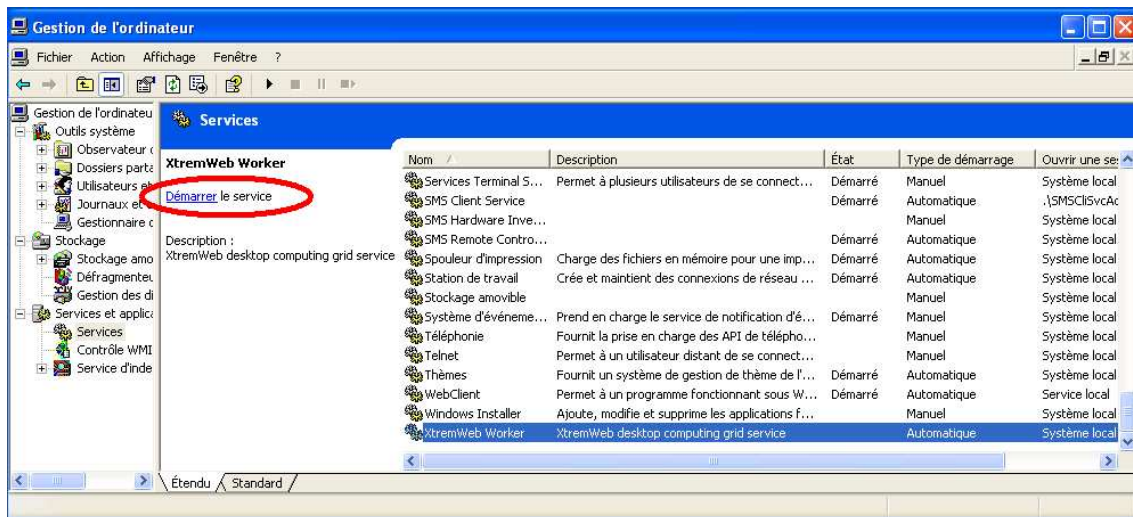
If you don't find the XWHEP worker in the list, it has not been correctly installed. Please, return to [\(undefined\)](#) [Windows service], page [\(undefined\)](#) and try again.

Figure 6 : Worker installed as NT service



You can click on the XWHEP worker service to select it and click on the “Start” item as shown in [Figure 7 : Start the NT service], page . Note that you don’t have to manually start the XWHEP worker; it is configured to start at every boot of your machine.

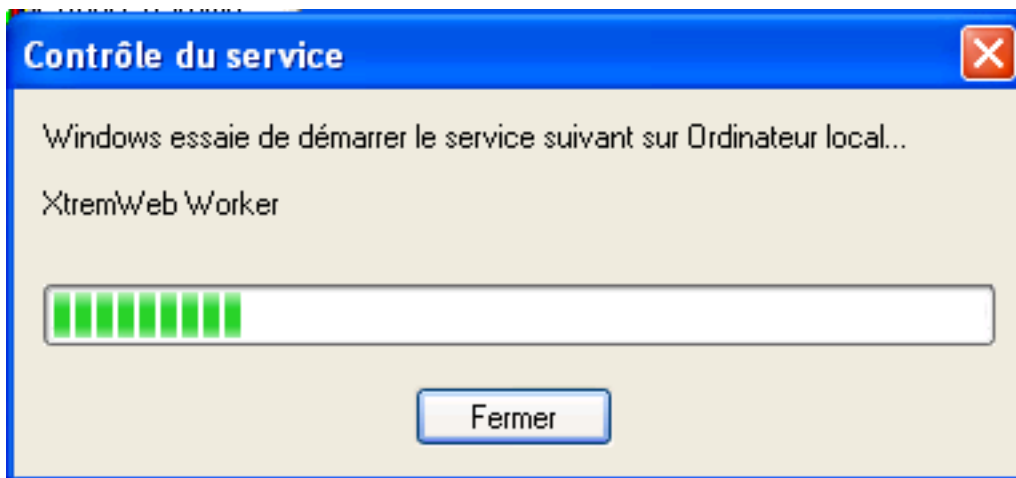
Figure 7 : Start the worker NT service



A pop-up window then appears with a progression bar. as shown in [\(undefined\)](#) [Figure 8 : Starting the NT service], page [\(undefined\)](#).

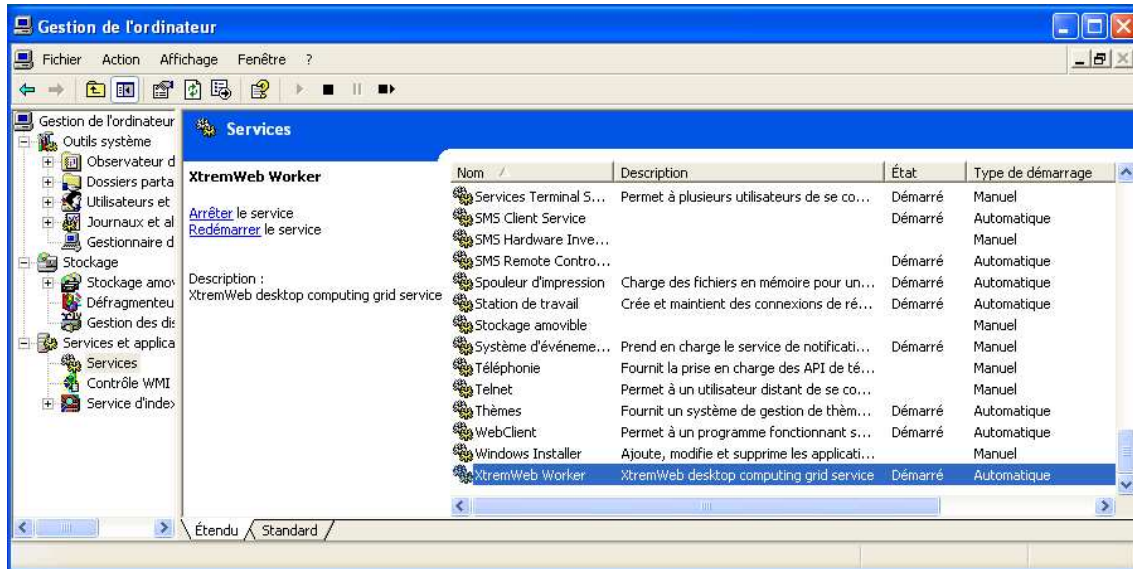
If something goes wrong (not enough privileges, Java not correctly installed...) a warning window appears. Please, return to [\(undefined\)](#) [Windows service], page [\(undefined\)](#) and try again.

Figure 8 : Starting the worker NT service



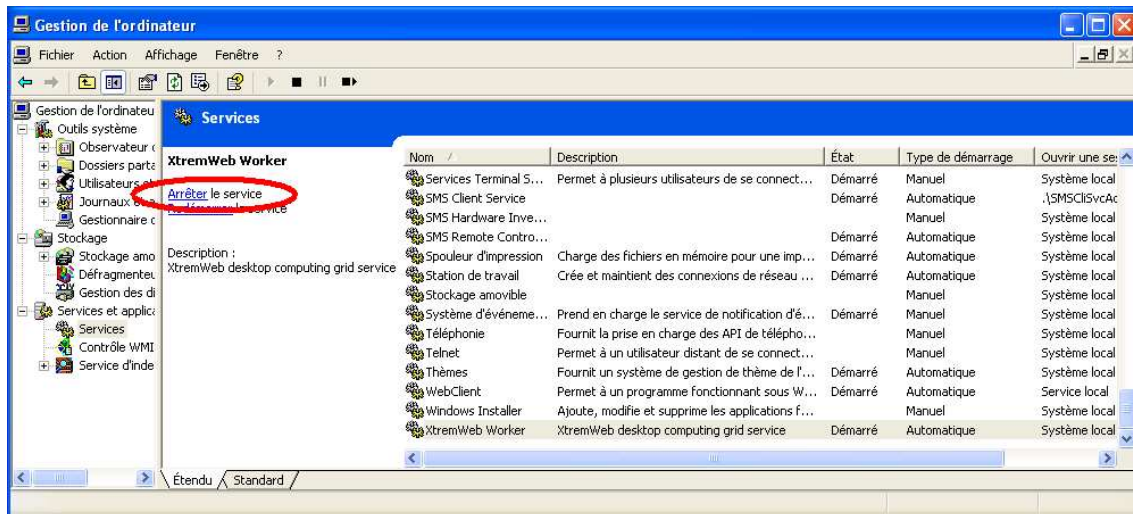
If the service has successfully been started, the “state” column should display “started” (noted as in [\(undefined\)](#) [Figure 9 : NT service started], page [\(undefined\)](#)) for the XWHEP worker service as shown in [\(undefined\)](#) [Figure 9 : NT service started], page [\(undefined\)](#).

Figure 9 : Worker NT service started



If you want to stop the XWHEP worker service, click to select it and click on the “Stop” item as shown in (undefined) [Figure 10 : Stop the NT service], page (undefined).

Figure 10 : Stop the worker NT service

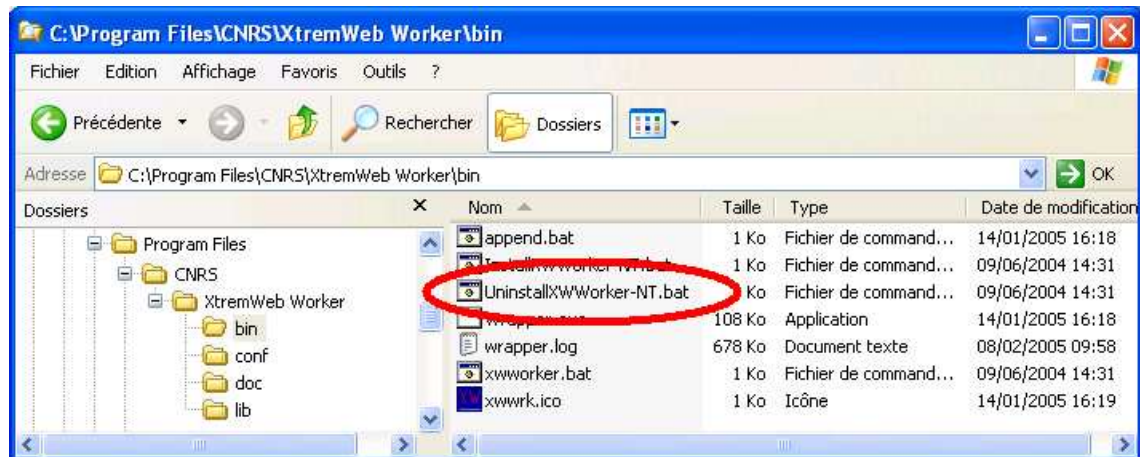


If you want to completely remove the XWHEP worker service, double click on 'bin/UninstallXWWorker-NT.bat' as shown in (undefined) [Figure 11 : Uninstall NT service], page (undefined).

You must have enough privileges to do so. If needed, please ask your system administrator.

Note that this does not remove the XWHEP package from your computer. To do so, please use the standard Windows procedure through the "configuration panel".

Figure 11 : Uninstall the worker NT service



Please see (undefined) [XWHEP worker], page (undefined) to see how to configure and run the worker.

5 Running the platform

This section describes how to manage and use the three XWHEP parts:

5.1 XWHEP server

The server is the centralized part in charge of the platform management. It aims to receive job requests from clients, schedule them on workers until successful completion, collect results and forward them back to clients.

5.1.1 Configuring the XWHEP server

You will find a `conf/xtremweb.server.conf` file in the distribution. If you have downloaded the sources distribution, the installation process create it for you in your installation directory by the `make install` command.

The configuration of the file consists of a pair of **keys** and their values separated by the `=` character. A line beginning by `#` is a comment.

- Server configuration
 - **xtremweb.role** must be set to **server**
 - **admin.login** is the login of the platform administrator
 - **HomeDir** is the path containing applications and tasks
 - **ModulesLogged** sets the expected modules list. Existing modules are DBI, Comm, Task:
 - DBI: Database Interface
 - Comm: Communication received
 - Task: Tasks scheduled
 - **XWServer** contains a space separated servers list; it is use for replication.
 - **port.tcp** port to connect the server through TCP (default 4321)
 - **port.udp** port to connect the server through UDP (default 4322)
 - **port.worker.http** port where the worker may listen at (default 4323)
 - **port.http** port to connect the server through HTTP (default 4324)
 - **port.https** port to connect the server through HTTPS (default 4325)
 - **port.xmlrpc** port to connect the server through XML RPC (default 4326)
 - **port.sunrpc** port to connect the server through SUN RPC (default 4327)
 - **java.nio** defines wether to use NIO. Forced to false with HTTP layer (default 4329)
- Database configuration
 - **XWdbHost** is the database server.
 - **XWdbName** is the database name Default in `xtremweb.sql` :`"xtremweb"` .

- **XWdbUser** is the name of the user granted to access the database.
- **XWdbPass** is the password of the user granted to access the database.
- Security configuration
 - **XWkeyStore** Put here the name of file containing the private key of the server and its certificate.
 - **XWpassPhrase** is the password needed to access that file ‘**XWCertPass**’ by default.
- Logging facilities

There are four levels: debug, info, warn and error.

5.1.2 Launch XWHEP server

Scripts to launch the server are stored in the ‘**bin/**’ directory.

Be aware that the script uses some definition in ‘**bin/xtremwebconf.sh**’. One should read and edit this file.

The script expect the configuration file to be located in ‘**conf/**’ directory.

The script ‘**bin/xtremweb.server**’ helps to manage the server. It request one argument which may take four values : console, start, stop and restart:

- **start** starts the server as daemon
- **console** starts the server in the foreground (not as daemon)
- **stop** stops the server
- **restart** stops and restarts the server.

Example:

```
xtremweb.server start
```

To launch the server, you must have sufficient privileges because the script try to execute the server under the "xtremweb" user defined in your ‘**xtremwebconf.sh**’ file.

5.2 XWHEP worker

The worker is the distributed part in charge of the computation. It aims to request jobs from the server and try to execute them. The worker compute in a non intruding way so that the owner of the machine is not disturb, accordingly to an activation policy defined in the `[xtremweb.worker.conf]`, page `[]`.

5.2.1 The worker configuration file

You will find a ‘`conf/xtremweb.worker.conf`’ file in the distribution. If you have downloaded the sources distribution, the installation process create it for you in your installation directory by the `make install` command.

The default configuration file for the worker is named ‘`xtremweb.worker.conf`’ and located in the ‘`conf/`’ directory. If the worker can’t access this file, it looks in your home directory in the subdirectory ‘`${HOME}/.XWHEP/xtremweb.worker.conf`’. In the source distribution there is a template called ‘`xwrc.in`’ in the ‘`misc`’ directory. For more details about installation see [\(undefined\)](#) [What has been installed], page [\(undefined\)](#).

You can also provide any other configuration file, see [\(undefined\)](#) [Launch XWHEP worker], page [\(undefined\)](#).

The configuration of the file consists of several pairs of ‘`keys`’ and their values separated by the `:` character. A line beginning by `#` is a comment.

- Connection configuration
 - **dispatcher.servers** sets the server to connect to; it a space separated servers list.
 - **port.tcp** port to connect the server through TCP (default 4321)
 - **port.udp** port to connect the server through UDP (default 4322)
 - **port.worker.http** port where the worker may listen at (default 4323)
 - **port.http** port to connect the server through HTTP (default 4324)
 - **port.https** port to connect the server through HTTPS (default 4325)
 - **port.xmlrpc** port to connect the server through XML RPC (default 4326)
 - **port.sunrpc** port to connect the server through SUN RPC (default 4327)
 - **java.nio** defines wether to use NIO. Forced to false with HTTP layer (default 4329)
- Activation Policy

The activation policy defines the worker availability; a worker is available when it may compute in a non intruding way.

 - **activator.class** defines the activation policy (when the worker can compute?)

Available policies:

 - **xtremweb.worker.AlwaysActive** : this always allows the worker to compute; this is the default.
 - **xtremweb.worker.DateActivator** : the worker availability is monitored by date and time.
 - **activator.date** defines dates and times ‘a la’ crontab, following these rules:
 - this string can contains two parameters : the **days of week**, then the **hours of days**
 - be aware that defining days with no hours, defines full days (e.g. 24 hours)

- several comma separated gaps may be provided
- Field grammar:
 - '*' : every possible values
 - <x> : a unic value
 - <x-y> : a couple of values separated by an hyphen ('-') defining a gap from x to y
- two fields are allowed :
 - 1st field defines days of week
 - '*' for every day
 - '1', 'sun' or 'sunday'
 - '2', 'mon' or 'monday'
 - ...
 - '7', 'sat' or 'saturday'
 - <N-M> a couple (of integers or Strings) defining days from N to M
 - 2nd field defines hours
 - '*' every hour
 - <N> an integer defining a complete hour ($0 \leq N \leq 23$)
 - <N-M> a couple of integers defining hours from N:00 to M:59 ($0,0 \leq N, M \leq 23,23$)
- Examples:
 - "*" : every days, full day
 - "*" 1" : every days, from 1:00AM to 1:59AM
 - "*" 11-17" : every days, from 11:00AM to 5:59PM
 - "1 *" : every sunday, full day
 - "Thu" : every thursday, full day
 - "2-Thu *" : from tuesday to thursday, full days
 - "4-2" : from thursday to tuesday, full days
 - "Thu-Tue 18-3" : from thursday to tuesday, from 6:00PM to 3:59AM
 - "Thu-Tue 18-3, Sat-Sun *" : from thursday to tuesday, from 6:00PM to 3:59AM **AND** every week end, full day
- **xtremweb.worker.CpuActivator** : the worker computing availability is monitored by the CPU activity.
 - **cpuload** defines the CPU activity level where the worker must stop working
If the owner of the machine request more than **cpuload%** of its CPU, the worker stops working.

- under **win32** : this is automatically replaced by the **xtremweb.worker.WinSaver**
 - under **Mac OS X** : this is automatically replaced by the **xtremweb.worker.DateActivator**
 - **xtremweb.worker.MouseKbdActivator** : the worker computing availability is monitored by the mouse/keyboard activity.
If the owner don't use its mouse/keyboard for 30 seconds, the worker may compute until the owner use mouse/keyboard.
This does not work under **Mac OS X**
 - **xtremweb.worker.WinSaverActivator** : the worker computing availability is monitored by the screen saver activity : if the screen saver is running, the worker may compute.
This this is **win32** only.
 - **xtremweb.worker.MacSaverActivator** : the worker computing availability is monitored by the screen saver activity : if the screen saver is running, the worker may compute.
This is **Mac OS X** only.
This does not work yet.
- Miscellaneous
 - **update.restartCommand** is not used
 - **alive.period** is not used; this is set by the server at connection time.
 - **tomcat.port** is not used yet.
 - **path.tmpdir** defines the directory where the worker can store things; default is system default (i.e. /tmp).
 - **workpool.size** sets the number of jobs the worker can compute simultaneously; default is the number of CPU.
 - **tracer.enable** tells whether worker activity traces should be collected and sent to the server; default if no.
 - **notify.enable** tells to display an icon in the task tray.
This is **win32** only.
 - **Logging facilities**. Please refer to [\(undefined\) \[XWHEP server\]](#), page [\(undefined\)](#).
- Security Configuration
 - **sandbox.enable** defines whether to use the sandbox. The sandbox is experimental and not provided in the distribution. For Mac OS X 10.5 and linux only.
 - **sandbox.name** defines whether to use the sandbox. The sandbox is experimental and not provided in the distribution. For Mac OS X 10.5 and linux only.
 - **sandbox.args** defines whether to use the sandbox. The sandbox is experimental and not provided in the distribution. For Mac OS X 10.5 and linux only.

- **sandbox.embedded** defines whether the sandbox can be found in the Java Jar file. The sandbox is experimental and not provided in the distribution. For Mac OS X 10.5 and linux only.
- **path.certfile** defines the SSL certificate file.

5.2.2 Launch XWHEP worker

5.2.2.1 Linux.

Scripts to launch the worker are stored in the ‘bin/’ directory.

Be aware that the script uses some definition in ‘bin/xtremwebconf.sh’.
One should read and edit this file.

The script ‘bin/xtremweb.worker’ helps to manage the worker. It request one argument which may take four values : console, start, stop and restart:

- **start** starts the worker as daemon
- **console** starts the worker without backgrounding it
- **stop** stops the worker
- **restart** stops and restarts the server.

Example:

```
xtremweb.worker start
```

You can also run the worker without the script and provide your own configuration file:

```
java -jar lib/xtremweb.jar xtremweb.worker.Worker --xwconfig <a configuration file>
```

To launch the worker as daemon, you must have sufficient privileges because the script try to execute the server under the "xtremweb" user defined in your ‘xtremwebconf.sh’ file.

5.2.2.2 Mac OS X.

The installer provide a worker that is launched at boot time.

The way to manage the worker is similar to Linux platform, except the script is in ‘/Library/StartupItems/xtremweb.worker/’. Please refer to See (undefined) [Launching under Linux], page (undefined) section.

5.2.2.3 Win32

If you have followed the instructions detailed in (undefined) [Win32 installation], page (undefined), the worker is automatically launched for you.

Otherwise, you have to double click on ‘xworker.bat’.

5.3 XWHEP client

The client is the distributed part in charge of the platform usage. It aims to insert/delete applications, users and jobs, as to retrieve results. .

Actions are executed accordingly the user privilege level.

5.3.1 The client configuration file

The client configuration file is the same as for the worker.

Please refer to [\[xtremweb.worker.conf\]](#), page [\[undefined\]](#).

5.3.2 Launch a XWHEP client

The client is a console application which aims to insert/delete applications, users and jobs, as to retrieve results.

Scripts to run the client are stored in the `'bin/'` directory.

Be aware that the script uses some definition in `'bin/xtremwebconf.sh'`.

One should read and edit this file.

Several scripts are provided.

5.3.2.1 The client common parameters.

The client accepts some parameters which may be combined with all client actions.

- `--xwhelp` to get some helps
 - this parameters is optionnal ;
 - this parameters needs no argument ;
 - if this parameter is provided, the script shows some helps and exits.
- `--xwgui` to get the graphic user interface (see [\[Client GUI\]](#), page [\[undefined\]](#))
 - this parameters is optionnal ;
 - this parameters needs no argument ;
 - if this parameter is provided, all other parameters are not used ;
 - if this parameter is provided, the client GUI is shown.
- `--xwconfig <a config file>` to provide a client configuration file.
 - this parameters is optionnal ;
 - this parameters needs one argument : a config file,;
 - if this parameter is not provided, the script looks whether a `'$HOME/.xtremweb/xwrc'` file exists.
- `--xwmacro <a macro file>` to provide a “macro” file (see [\[Client macro file\]](#), page [\[undefined\]](#).)
 - this parameters is optionnal;
 - this parameters needs one argument : a “macro” file,;
 - if this parameter is provided, all other parameters are not used.
- `--xwformat <a format>` to get output in raw text, HTML, XML or CSV

- this parameters is optionnal.
- this parameters needs one argument which may take one of theses values;
 - **XML** to get the output as XML;
 - **HTML** to get the output as HTML;
 - **CSV** to get the output as comma separated values.
- if this parameter is not provided, default output is XML.
- `--xwremove <object UID>` to remove an object specified by its UID. An object can be a user, an application, a job, a data... anything handled by the client. A script to change the access right of an object is provided with the package: `'bin/xwchmod'`. A script to remove an object is provided with the package: `'bin/xwrm'`. Any removed object is marked as deleted in the database.

5.3.2.2 User management with the XWHEP client

The client accepts some parameters dedicated to user management : insert and delete users to/from the platform.

The user management accepts some `<undefined>` [The client common parameters], page `<undefined>`.

Here follow the client parameters dedicated to user management.

- `--xwgetusers` : list the users present in the platform.
 - this parameters needs no argument;
 - this action requires administrator privileges to get full users list; otherwise one gets its own user informations only.
- `--xwsenduser <login> <password> <email> <rights> <usergroup> [--xwcert <X.509 cert or proxy>]` insert a new user binary in the platform;
 - this action requires administrator privileges;
 - this parameters needs four arguments in the exact following order:
 - **login** the login for this user.
 - **password** the password for this user.
 - **email** the email of this user.
 - **rights** the privilege level for this user.
 - **usergroup** to insert the user in a specific group.
 - `-xwcert` to specify the certificate to use if needed for authentication.
 - the **login** must be unic in the platform. If this login already exists, the insertion fails.

A set of scripts to manage the users is provided with the package : `'bin/xwusers'`, `'bin/xwsenduser'`, `'bin/xwusergroups'`, `'bin/xwsendusergroup'`...

5.3.2.3 Application management with the XWHEP client

The client accepts some parameters dedicated to application management : insert and delete applications to/from the platform.

The application management accepts some `<Application Name>` [The client common parameters], page `<undefined>`.

Here follow the client parameters dedicated to application management.

- `--xwgetapps` : list the applications present in the platform.
 - this parameter needs no argument.
- `--xwsendapp <Application Name> <CPU> <OS> <URI to binary>` insert a new application in the platform;
 - this action requires administrator privileges;
 - this option needs four arguments in the exact following order:
 - **Application Name** is a name of your choice for this application;
 - **CPU** indicates the type of architecture the binary file has been compiled for (ix86, alpha, ...)
 - **OS** indicates the type of operating system the binary file has been compiled for (Linux, win32, ...)
 - **URI** is the path as a URI to the binary file for this application that will be executed by workers for jobs associated with this application.
 - this set of four arguments must be **UNIC** in the platform. If you insert a new application with the same arguments, then the existing application will be replaced by the new one. If you have more than one binary for one application (e.g, for Mac OS X, Win32, Linux...), insert an application for each binary, with the same **Application Name**, but with different **CPU**, **OS** and **URI** options.

A set of scripts to manage the applications is provided with the package : `'bin/xwapps'`, `'bin/xwsendapp'`.

5.3.2.4 Jobs management with the XWHEP client.

The client accepts some parameters dedicated to jobs management : insert and delete jobs to/from the platform.

The job management accepts some `<undefined>` [The client common parameters], page `<undefined>`.

Here follow the client parameters dedicated to job management.

- `--xwgetworks [jobUID, jobUID...]` : list job status.
 - this returns jobs for the user as provided in `(undefined)` [xtremweb.worker.conf], page `(undefined)`;
 - this parameters needs zero or more arguments;
 - if no **job UID** is provided, this retrieves all jobs for the user;
 - **job UID** : one or more space separated jobUID may be provided.
- `--xwgettasks [jobUID, jobUID...]` : list status of job instances (i.e. job and associated running worker).
 - this returns job instance status for the user as provided in `(undefined)` [xtremweb.worker.conf], page `(undefined)`;
 - this parameters needs zero or more arguments;
 - **job UID** job UID to retrieve instance status for.
- `--xwsendwork <Application Name> [--xwenv <zip file>] [--xwcert <cert or proxy>] [--xwlabel <label>] [application parameters] ['<' <input file>]` insert a new job.
 - this requires job insertion privilege level (rights above or equal to 5 as shown by `(undefined)` [xwusers], page `(undefined)`).
 - this parameters needs at least one argument;
 - **application name** is required; it is the name of an installed application as shown by `(undefined)` [xwapps], page `(undefined)`;
 - `--xwenv <zipfile>` is optionnal and specify a zip file containing a set of files needed by the job at runtime. This is known as the **job environment**. This option accepts a zip file, a directory structure or a file name. In the last cases, the client create a new zip file containing the provided directory and/or files for the job.
 - `--xwlabel <label>` is optionnal and specifies a symbolic label of your choice for this job.
 - `--xwcert <cert or proxy>` is optionnal and specifies what X.509 certificate or proxy tu use for this job.
 - **application parameters** is optionnal and specific to the requested application;
 - **input file** is optionnal and specify standard input for your job (this **must** be after the character '<');

A set of scripts to manage jobs are provided with the package in the 'bin/' directory.

- xwworks;
- xwtasks.
- xwsendwork.

5.3.2.5 Results management with the XWHEP client.

The client accepts some parameters dedicated to job results management : retrieve and delete job results.

The results management accepts some `<undefined>` [The client common parameters], page `<undefined>`.

Here follow the client parameters dedicated to results management.

- `--xwresult [jobUID, jobUID...]` : retrieve job results.
 - this downloads job results for the user as provided in `<undefined>` [xtremweb.worker.conf], page `<undefined>`. Results are stored on the client runtime directory.
 - this parameters needs zero or more arguments;
 - if no job UID is provided, this retrieves all results for the user;
 - job UID : one or more space separated jobUID may be provided.

5.3.2.6 The client macro file

The client accepts “macro” file, which is just a text file with one command per line.

A macro file is provided to the client with the parameter `--xwmacro <a macro file>`.

This parameter cancels all other client parameters but the `--xwconfig` parameter.

Examples:

```
xtremweb.client --xwmacro <a macro file>
```

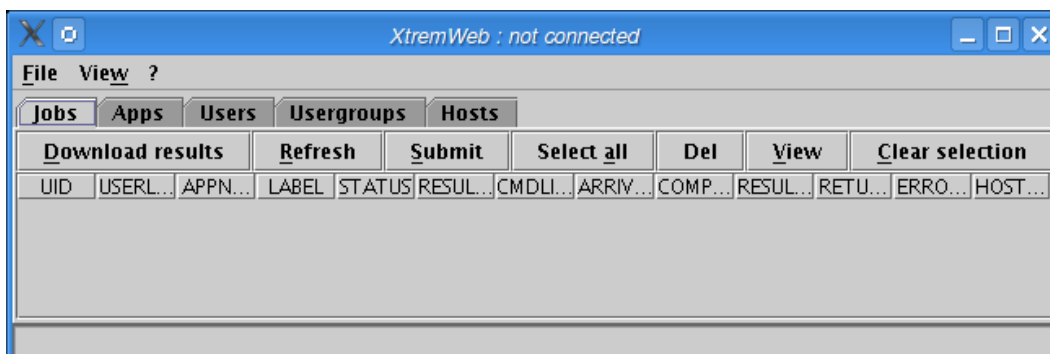
```
xtremweb.client --xwconfig <a configuration file> --xwmacro <a macro file>
```

5.3.2.7 The client GUI

When launching the client with the `-xwgui` parameter (or when launching either the Mac OS X or Windows client), the main frame pops up as shown on `<undefined>` [Figure 14 : the client main frame], page `<undefined>`.

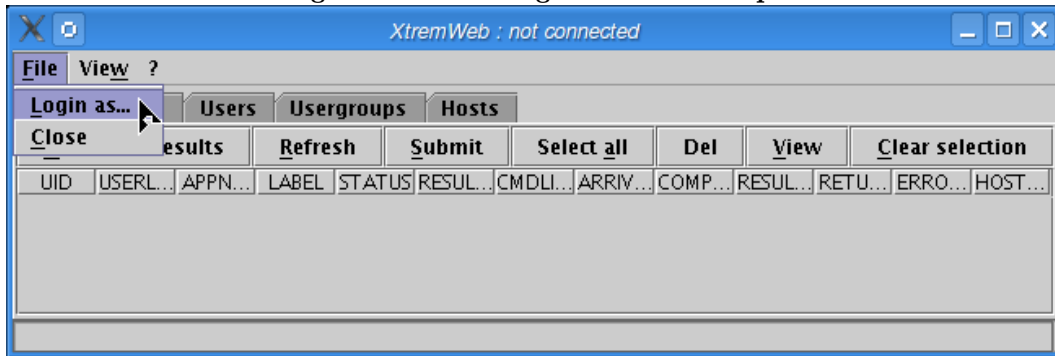
As shown on the title, we are not connected to the platform yet.

Figure 14 : the client main frame



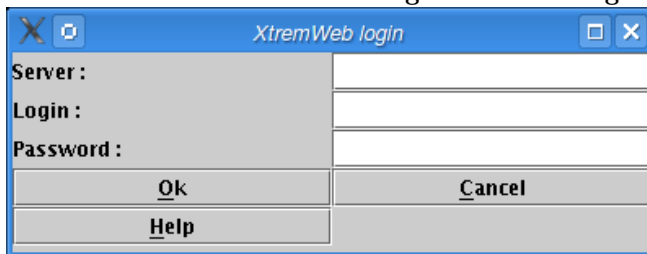
To connect, please select “Login as...” option in the “File” menu (figure <undefined> [Figure 15 : the “Login as...” menu option], page <undefined>).

Figure 15 : the “Login as...” menu option



The login dialog pops up as shown on figure <undefined> [Figure 16 : login dialog], page <undefined>. You must fill the three fields.

Figure 16 : the login dialog



If the server is not reachable the server error dialog pops up (figure <undefined> [Figure 17 : server error dialog], page <undefined>).

Figure 17 : the server error dialog

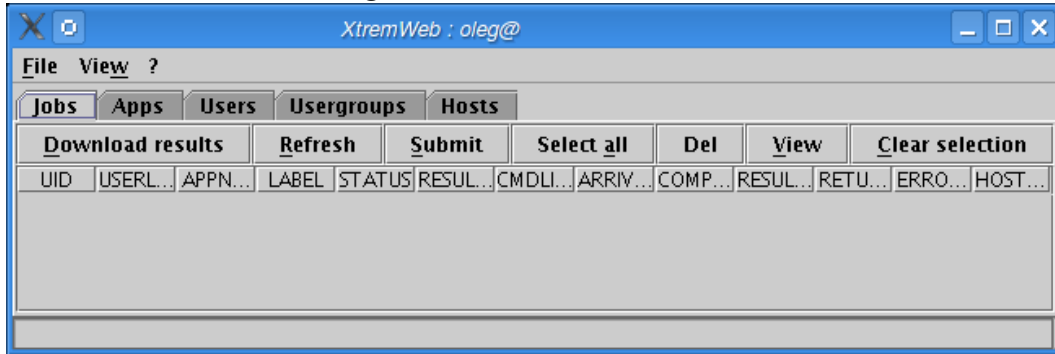


If the login and/or password is not valid, or if the user is not authorized to connect, the error dialog pops up (figure <undefined> [Figure 18 : connect error dialog], page <undefined>).

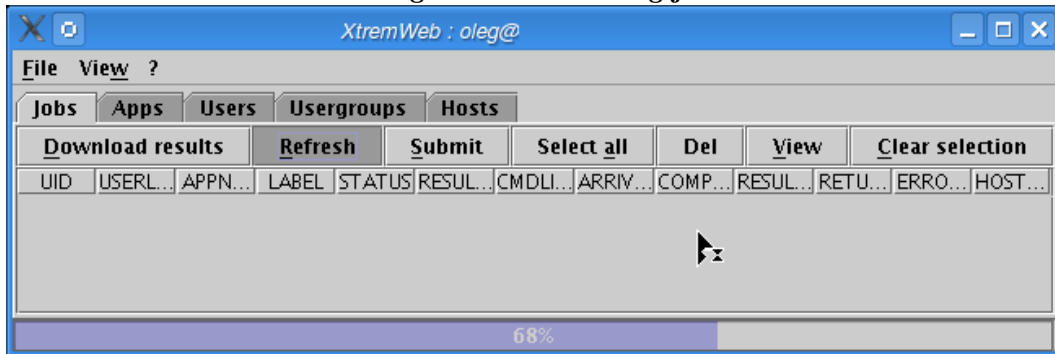
Figure 18 : the connect error dialog



Once connected, the title displays the login (figure <undefined> [Figure 19 : connected], page <undefined>).

Figure 19 : The user is connected

Click on "Refresh" to get your jobs list. The progress bar shows the download progression (figure <undefined> [Figure 20 : jobretriving], page <undefined>).

Figure 20 : Retreiving jobs

As the download completes, your jobs are listed. The status bar shows the total of rows (figure <undefined> [Figure 21 : jobretrived], page <undefined>).

Figure 21 : Jobs retrieved

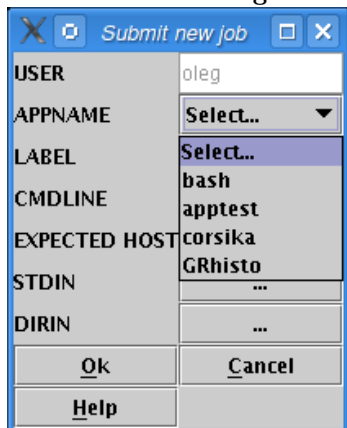
UID	USERLOGIN	APPNAME	LABEL	STATUS	RESULTST	CMDLINE	ARRIVALD	COMPLET	RESULTDA	RE	ERROR_MSG	HOSTNAME
-460ac7...	oleg	GRhisto		COMPLET...	AVAILABLE	Wed May ...	Thu Jun 0...	Thu Jun 0...	0			mac-ens4.la...
-460ac7...	oleg	GRhisto		COMPLET...	AVAILABLE	Wed May ...	Thu Jun 0...	Thu Jun 0...	0			pc-albert
-460ac7...	oleg	GRhisto		COMPLET...	AVAILABLE	Wed May ...	Thu Jun 0...	Thu Jun 0...	0			mac-ens8.la...
-460ac7...	oleg	GRhisto		COMPLET...	AVAILABLE	Wed May ...	Thu Jun 0...	Thu Jun 0...	0			mac-ens4.la...
-460ac7...	oleg	GRhisto		COMPLET...	AVAILABLE	Wed May ...	Thu Jun 0...	Thu Jun 0...	0			mac-ens10.l...
-460ac7...	oleg	GRhisto		COMPLET...	AVAILABLE	Wed May ...	Thu Jun 0...	Thu Jun 0...	0			mac-ens3.la...
-460ac7...	oleg	GRhisto		COMPLET...	AVAILABLE	Wed May ...	Thu Jun 0...	Thu Jun 0...	0			pc-albert
-460ac7...	oleg	GRhisto		COMPLET...	AVAILABLE	Wed May ...	Thu Jun 0...	Thu Jun 0...	0			mac-ens7.la...
-460ac7...	oleg	GRhisto		COMPLET...	AVAILABLE	Wed May ...	Wed May ...	Wed May ...	0			mac-ens8.la...
-460ac7...	oleg	GRhisto		COMPLET...	AVAILABLE	Wed May ...	Thu Jun 0...	Thu Jun 0...	0			mac-ens4.la...
-460ac7...	oleg	GRhisto		COMPLET...	AVAILABLE	Wed May ...	Thu Jun 0...	Thu Jun 0...	0			mac-ens1.la...
-460ac7...	oleg	GRhisto		COMPLET...	AVAILABLE	Wed May ...	Thu Jun 0...	Thu Jun 0...	0			mac-ens10.l...
-460ac7...	oleg	GRhisto		COMPLET...	AVAILABLE	Wed May ...	Thu Jun 0...	Thu Jun 0...	0			mac-ens10.l...
-460ac7...	oleg	GRhisto		COMPLET...	AVAILABLE	Wed May ...	Thu Jun 0...	Thu Jun 0...	0			mac-ens5.la...
-460ac7...	oleg	GRhisto		COMPLET...	AVAILABLE	Wed May ...	Thu Jun 0...	Thu Jun 0...	0			mac-ens8.la...
1e9cb75...	oleg	GRhisto	un	ERROR	UNAVAIL...	Tue May ...				0	can_t_store_j...	mac-ens10.l...
1e9cb75...	oleg	GRhisto	cinq	COMPLET...	AVAILABLE	Tue May ...	Wed May ...	Wed May ...	127			auger16.la.l...
1e9cb75...	oleg	GRhisto	six	COMPLET...	AVAILABLE	Tue May ...	Wed May ...	Wed May ...	127			auger16.la.l...
1e9cb75...	oleg	GRhisto	quatre	COMPLET...	AVAILABLE	Tue May ...	Wed May ...	Wed May ...	127			auger16.la.l...
1e9cb75...	oleg	GRhisto	trois	COMPLET...	AVAILABLE	Tue May ...	Wed May ...	Wed May ...	127			auger8.la.lin...
1e9cb75...	oleg	GRhisto	dix	COMPLET...	AVAILABLE	Tue May ...	Wed May ...	Wed May ...	127			auger2.la.lin...
1e9cb75...	oleg	GRhisto	sept	COMPLET...	AVAILABLE	Tue May ...	Wed May ...	Wed May ...	127			auger8.la.lin...
1e9cb75...	oleg	GRhisto	huit	COMPLET...	AVAILABLE	Tue May ...	Wed May ...	Wed May ...	127			auger2.la.lin...
1e9cb75...	oleg	GRhisto	neuf	COMPLET...	AVAILABLE	Tue May ...	Wed May ...	Wed May ...	127			auger15.la.l...
-460ac7...	oleg	GRhisto		COMPLET...	AVAILABLE	Wed May ...	Thu Jun 0...	Thu Jun 0...	0			mac-ens8.la...
-460ac7...	oleg	GRhisto		COMPLET...	AVAILABLE	Wed May ...	Thu Jun 0...	Thu Jun 0...	0			mac-ens7.la...

Click on “Submit” to submit a new job (figure <undefined> [Figure 22 : submit0], page <undefined>).

Figure 22 : Submit a new job

USER	oleg
APPNAME	Select...
LABEL	
CMDLINE	
EXPECTED HOST	
STDIN	...
DIRIN	...
Ok	Cancel
Help	

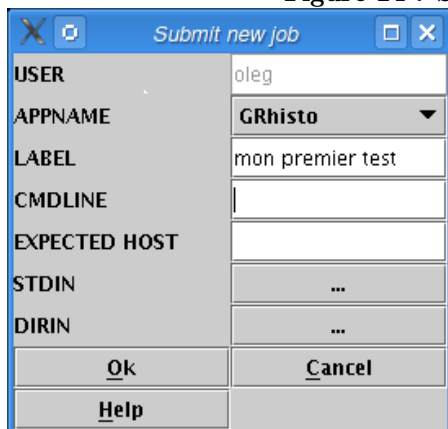
Select an application from the dropdown menu (figure <undefined> [Figure 23 : submit1], page <undefined>).

Figure 23 : Submit a new job; select an application

The screenshot shows a dialog box titled "Submit new job" with a blue header bar. The dialog contains several fields and buttons:

USER	oleg
APPNAME	Select...
LABEL	Select...
CMDLINE	bash
EXPECTED HOST	corsika
STDIN	GRhisto
DIRIN	...
<input type="button" value="Ok"/> <input type="button" value="Cancel"/>	
<input type="button" value="Help"/>	

Give a job label (this is optionnal) (figure <undefined> [Figure 24 : submit2], page <undefined>).

Figure 24 : Submit a new job; give a label

The screenshot shows the same "Submit new job" dialog box, but with the "LABEL" field filled with the text "mon premier test".

USER	oleg
APPNAME	GRhisto
LABEL	mon premier test
CMDLINE	
EXPECTED HOST	
STDIN	...
DIRIN	...
<input type="button" value="Ok"/> <input type="button" value="Cancel"/>	
<input type="button" value="Help"/>	

Click on "View" (shown on figure <undefined> [Figure 21 : jobretrieved], page <undefined>) to see job details (figure <undefined> [Figure 32 : jobdetails], page <undefined>).

Figure 32 : Job details



The image shows a 'Job viewer' dialog box with a blue title bar and standard window controls. The dialog contains a table of job details. The fields are as follows:

UID	1e9cb75:10b8e7cab6c:-7fff
USERLOGIN	oleg
APPNAME	GRhisto
LABEL	mon_premier_test
STATUS	WAITING
RESULTSTATUS	UNAVAILABLE
CMDLINE	
ARRIVALDATE	Thu Jun 01 09:36:44 CEST 2006
COMPLETEDDATE	
RESULTDATE	
RETURNCODE	0
ERROR_MSG	
HOSTNAME	

At the bottom of the dialog, there are three buttons: 'Ok', 'Cancel', and 'Help'.

6 Connecting XWHEP to other grids

Pilot Jobs is a way to use a Grid infrastructure to deploy end user jobs with an external scheduler (i.e. a scheduler which is not part of the infrastructure itself). XtremWeb and Condor teams have introduced this as Glidein in XtremWeb & Condor : sharing resources between Internet connected Condor pools. (O. Lodygensky, G. Fedak, F. Cappello, V. Neri, M. Livny, D. Thain at CCGRID 2003, Tokyo, JAPAN; May 12-15, 2003.)

Security, monitoring and logging are the main issues in Pilot Jobs. (<http://edms.cern.ch/document/855383>)

XWHEP solves these issues thanks to its innovative features:

- user rights management
- user rights delegation
- user groups
- user group applications

Security is ensured at three levels:

- computing node.
 - XWHEP includes a sandbox to isolate end user job computation
 - only validated applications from repository are candidate to run on SG nodes
- Application and data integrity.
 - application repository and data servers (including XWHEP) ensure integrity
- User authentication
 - only X.509 certified users can use SG nodes
 - users provide proxy certificate to submit a job to XWHEP scheduler
 - this proxy is used to submit Pilot Jobs to SG

Figure33 : Pilot Jobs

7 Troubleshooting and reporting bugs

Please report any bugs, remarks, questions etc. to our Trac web site (<http://trac.lal.in2p3.fr/DGHEP>): <http://trac.lal.in2o3.fr/DGHEP>

8 Index

C

Conventions 1

R

Reading conventions 1